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Since results were uniform, mention of the third case will suffice.

Upon June 27, 1889, the left hemisphere was removed. The right hemisphere was similarly excised a year later, June 17, 1890. The dog, in general, continued in good health, and was killed December 31, 1891.

Three days after the second operation, the dog could walk without help. Subsequent tests demonstrated that hearing was present in some degree, the animal being awakened by the blast of a horn. He also reacted to light, and was found to be sensitive to touch and pain in all parts of the body. Even the presence of smell, Goltz seems to consider, admits of question, since this could not be satisfactorily tested. The animal sneezed when tobacco smoke was blown in his face. He could taste, as was evinced by his refusing, with every expression of disgust, meat which had been rolled in quinine. The same meat was similarly rejected by his own dog on first tasting, but was subsequently gulped down "out of politeness." A brainless dog does lack politeness, as the author humorously adds.

Two points are of special interest to brain physiology in general. The first of these is that this dog required much shorter periods of rest or sleep than normal animals; and also became more quickly fatigued. This leads to the second point, which is that if over-excited or over-tired, the dog is likely to be thrown into a fit of epilepsy (p. 591). That an animal deprived of all motor cortex can exhibit typical epilepsy, is certainly revolutionary to post-Jacksonian ideas of the cause and origin of epileptic fits.

The brain was turned over to Schrader for examination and description. Dorsal and ventral views are given in the plate.

*The Arrangement of the Sympathetic Nervous System, Based Chiefly on Observations upon Pilo-Motor Nerves.* J. N. LANGLEY. *Journal of Physiology*, Vol. XV. pp. 176-244. Plates VII.-IX. Sept., 1893.

Reactions of the hair muscles are found to be of great service in determining the course of sympathetic fibers from the cord, through the sympathetic ganglia to their distribution in the skin. In brief this course is found to be the same as that of vasomotor and secretory fibers; viz., out of the cord by the spinal roots, through the white rami to the sympathetic ganglia, from this back to the spinal nerves, by the grey rami, and finally along with the cutaneous nerves to the skin. In the cord pilo-motor nerves are shown by properly graded stimulus to lie in the lateral columns; and their course out of the cord is entirely by the anterior roots. By the nicotin method, injection of ten milligrams into a vein, for the cat, it was demonstrated that all pilo-motor fibers are interrupted by cells in the sympathetic ganglia in passing through them to the skin. Distribution in the skin is found to coincide with that of the sensory nerves. It is unilateral, overlapping the mid-line very little, if at all; and successive grey rami supply successive sensory areas, generally quite sharply defined. A minute's description of relations of skin-areas to the different nerves is given for the cat, and the paper closes with deductions therefrom as to the arrangement of the sympathetic system in man.

*On Disturbances of Sensation with Especial Reference to the Pain of Visceral Disease.* HENRY HEAD. *Brain*, Vol. XVI. pp. 1-133. Plates I. and II. 42 illustrations in text. 1893.

A convenient paper for reference upon distribution of sensory nerves in the skin, aside from its main purpose. Areas for touch supplied by the spinal nerves have been shown by Sherrington to

overlap considerably ; whereas, according to our author's observations, areas for pain, heat and cold do not overlap perceptibly. They correspond closely to the area of trophic influence supplied by each spinal nerve, these latter being indicated by areas of eruption in herpes zoster. In connection with disease of any visceral organ, disturbances of dermal sensations for pain and temperature are likely to arise over sharply defined areas. Pain in these cases is projected peripherally by allocheiria, *i. e.*, pain in an insensitive portion, *e. g.*, a viscus, being projected to a more sensitive part, the skin, supplied from the same segment of the spinal cord. The present paper deals with arrangement of nerves and skin-areas below the clavicles. The author promises a paper in the near future to cover the region of head and neck.

*Untersuchungen über die Entwicklung der Area und Fovea centralis retinae.* J. H. CHIEVITZ. *Archiv für Anat. u. Entwicklungsgeschichte.* 1890, pp. 332-365. Plates XVIII.-XX.

Development of retinal elements, especially in the region of the area or fovea centralis, is outlined in four species of bird, viz., crow, finch, domestic pigeon and one of the gulls, *sterna cantiaca*, in one lizard, *lacerta vivipara*, and in a teleost, *sygnathus typhle*. The rabbit possesses no fovea proper, but an area centralis, "streifenförmig," which extends horizontally through the entire retina just below the entrance of the optic nerve. All the birds were found to have a central fovea well developed, and in the gull two foveas were demonstrated, a nasal and temporal, and in addition a "streifenförmige" fovea, which the author does not discuss. The lizard has no fovea, but a circular area centralis situated just above the optic papilla. A "punctförmige" fovea was demonstrated in *sygnathus* located caudad of the optic papilla, somewhat nearer the papilla than the ora serrata. The greater part of the posterior half of the retina is modified into an expanded area centralis having the fovea in its center. The fovea assumes its special characters late in embryonic life.

*Untersuchungen über den electrischen Leitungswiderstand der thierischen Gewebe.* K. ALT, AND SCHMIDT. *Archiv f. d. ges. Physiol.* Bd. LIII. S. 575. Taf. 13.

Recent work upon this subject has given currency to the idea that the fluids contained in a nerve cause its electrical resistance to be about that of the blood or lymph. The above paper tends to bring us back to the notions of the physiologists who wrote before it was demonstrated, that a nerve impulse is not an electrical current.

The method employed consisted in placing a given length of tissue in the circuit, composed of semi-circles of zinc and copper; contact completing the circuit on the other side being made by a micrometer screw. The zinc arc was connected to a friction machine, the copper with a water-pipe. The electricity generated could thus go to ground either through the tissue or through the micrometer screw. By manipulating the screw it was thus possible to measure the length of the spark, and this was taken to indicate the resistance.

Results of experiments on a large number of organs are given in a table at the end of their article. The following figures are extracted :